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Abstract

This paper focuses on enhanced consumer involvement in service development. The study was conducted in the context of speech recognition technology and its applications to telephone services. These services are just entering the market; issues of usability, utility and acceptability are thus crucial. We evaluate the usefulness of quantitative and qualitative methods for consumer involvement and their contribution of ideas and improvements for product development.

1.   Introduction

New technologies can significantly enhance the accessibility, usefulness and cost-effectiveness of telephone services. Yet designers of new technology-based services need to take into account the contexts, needs and abilities of their future end-users. In recent years, a variety of approaches for learning about users and their needs have evolved. This paper is part of an ongoing project experimenting with such approaches and evaluating their usefulness for companies providing digital services.

The project deals with users' active participation in the innovation process, with a special focus on experience-based user input. The ultimate goal of the project is to develop recommendations about how to involve users and promote customer-orientation among small technology companies. We report here on one case study conducted within this project: our co-operation with a company producing automatic speech recognition technologies and services called Suomen Puheentunnistus Oy (Finnish Speech Recognition Ltd.).

Speech recognition technology is used more and more for telephone applications like travel booking and information, financial account information, customer service call routing, and directory assistance. In the future, automatic speech recognition can be an important factor in m-business and m-government applications. But unlike many English-speaking countries, telephone services based on automatic speech recognition are not yet

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widespread in Finland. Developing the necessary technology is a complex task that needs to be done separately for each language.

Basic functionality is of course a prerequisite for marketing any kinds of technology-based services. In automatic speech recognition, developing such basic functionality may, in itself, be quite a daunting task, involving significant investment of time and language technology skills. Yet when developing full-scale services, service usability also needs to be considered, as well as the appropriateness and acceptability of the technology for different kinds of services.

With this background, the purpose of this case study was to:

(a) select and apply methods of user involvement that are appropriate for the context of this specific technology development project; and

(b) evaluate the usefulness of the information thus gained for product development.

The paper is organized as follows. First, an overview is given of the theoretical background and various approaches to user involvement. Then, we describe the context and design of the user involvement project in our case study and the type of input gained from users. We then turn to consider the impact of our intervention on the case company's product development practices. Finally, we consider some more general implications for user involvement in the development of telephone services.

2. Theoretical Background: Potential and Limits of User Involvement

There is a growing interest in involving users in the innovation process. Companies today believe that understanding the "voice of the customer" is important – for example, failures in new product introductions are most usually attributed to a lacking understanding of customer needs (Hanna et al. 1995). In the wake of consumer and marketing research, a focus on *users* has recently also become topical in information system science, product development and innovation management.

Alongside traditional market research methods such as market surveys, focus groups and concept testing (e.g., Threlfall 1999), a number of new and interesting approaches have evolved to involve customers and users in the product development process. For example *usability research*, traditionally focused on functional aspects, has recently taken on a number of new challenges – including more focus on context, user participation and other than purely functional criteria (Monk 2002; Karat and Karat 2003). In information systems, there is also a long-standing tradition of research into *technology acceptance* and adoption (see, e.g,. Venkatesh et al. 2003). More recently, attention has also been directed to the cultural and contextual factors underlying the attitudes and behavioural intentions (cf. e.g., Higgins 2000). Such issues require a more prospective and context-sensitive approach to acceptance research, such as the use of scenarios and contextual inquiry (e.g. Forest and Arhippainen 2005).

These and other new methods, such as ethnographic field studies, contextual design and participatory design, reflect a desire to involve users earlier on, and more deeply, in the product development process (e.g., Beyer and Holtzblatt 1998; Kaulio 1998; Kujala 2003). Although there are many individual methods with different names, a key feature in all is the intensified *interaction* between the world of designers and the world of users. Designers may go to the users' homes or workplaces and use ethnographic observation to understand the users' world. Or users may join designers 'at the drawing board', for example by participating in "user groups" (Tomes et al. 1996).

As the interest in user involvement mounts, it also becomes evident that the research and practice in this field is largely at an experimental stage. While the importance of user involvement is generally acknowledged, a number of problems have also been identified:

What is the role and expected input of the users? Are users providers of contextual information, a source of new ideas, partners in the product development process, or providers of useful feedback? Obviously, users may have all or any of these roles, and many user involvement studies in fact collect data that is relevant for both product development and strategic marketing.

Are users capable of presenting useful information? It is often noted that users may find it difficult to verbalize their needs (von Hippel 1998), or may themselves be unaware of their requirements (Riquelme 2001). Obviously, merely "asking users" (e.g., through surveys) is often an inadequate approach. There are, however, methods through which users can be progressively involved in the design process – i.e., by gradually progressing from "troubleshooting" and basic functionality issues to more strategic issues at the concept design level (e.g. Tomes et al. 1996) – or in which user ideas can be used indirectly as a resource for learning in product development (LeMasson and Magnusson 2002).

What are the costs and benefits of user involvement? From the producer's perspective, Kujala (2003) has considered the costs and benefits of user involvement, showing that user involvement may be a costly process that requires time and effort, and does not automatically lead to better design. For digital products and services, some of these costs can be reduced, however, by utilizing Web-based participation or observation (e.g., Monk 2002; Magnusson 2003).

How are users integrated in the product development process? Integrating expertise in product development is always problematic (e.g., Kotro et al. 2005). User involvement appears to encounter similar problems (Kujala 2003): participatory design may be conducted in isolated projects, designers may be unwilling to engage with users, user involvement may disrupt time-limited product development cycles, and field studies and ethnographic research may generate an excess of raw data. Thus, user involvement requires intensive management in order to be truly useful.

3.   Case Study: Early-Stage Consumer Feedback on Speech Technology Services

In addition to the range of approaches and methods developed for user involvement, we naturally needed to consider the context and needs of the company involved in the case study. In the following, we outline the case study context and how it was taken into account in designing our user involvement experiment. We also present findings from two different forms of user involvement: a survey and focus group discussions. On the basis of interviews and meetings with the company representatives, we evaluate the usefulness of the user input for product development.

3.1   Case Study Context and Design

Suomen Puheentunnistus Oy has been in operation since 2005. During this short period, the company has managed to develop small-scale Finnish-language speech-recognition services, as well as a range of service prototypes, in partnership with IBM. Service prototypes ranged from making an appointment to changing the terms of one's car insurance. A common feature in these services was that they were aimed at organizational customers operating telephone services. Thus, the *customers* of the services would be companies or public-sector organizations wishing to improve the efficiency of their

telephone services. The users of the services would be *consumers* or *employees of other companies* making use of these telephone services. Our case company had close contacts with its customers, but was enthusiastic about gaining more input from *users*.

This product development stage involved a mixture of concept development (new services) and refinement of existing service prototypes. There was a need to test the basic functionality of the speech recognition – which requires testing by a wide range of speakers representing different modes of speech and pronunciation. On the other hand, we perceived a need to test the usability of the service: how logically the service process proceeds, and how easy it is for users to accomplish their tasks. New technologies can also have significant social impacts, and hence we decided to explore users' views of the acceptability of the technology in different applications.

Our partner company's and our own research team's slightly different objectives resulted in a wide range of needs and expectations. Hence, we concluded in using a four-layered study design involving the following stages:

(1) *Testing of a service prototype:* This stage served three purposes. First, it helped to test basic service functionality (i.e, operation of the speech recognition technology). Thus, respondents were asked to try out a service prototype for booking an appointment at the local healthcare clinic, involving a number of speech recognition elements. Secondly, it served as a first input for direct feedback: respondents were asked about impressions of the service during the phone call and the responses were recorded. Thirdly, it allowed us to build up user experience, enabling users to take a more informed stand on the technology and its applications.

(2) *Questionnaire survey:* After trying out the service, users were asked to fill in an e-mail questionnaire. This included questions about the ease-of-use and convenience of the speech-recognition-based service compared to other ways of making an appointment at the healthcare clinic, as well as about the users' evaluations of the suitability of automatic speech recognition for different applications. Open-ended questions invited the respondents' further explanations for their viewpoints, as well as any other feedback they might like to give.

(3) *Focus group discussions* (see, e.g., Boddy 2005) were employed to gain qualitative data on broader aspects of service acceptability, and gain users' suggestions for improvements as well as their ideas for future application areas.

(4) *Interviews and meetings with the product developers* were used to gauge the usefulness of our interventions. A more formal group interview at the end of the project capped our co-operation, and served as a final evaluation of the user involvement process and its usefulness for product development.

3.2   Consumers' Views of Services Based on Speech Technology

The user data were gathered using the National Consumer Research Centre's Consumer Panel. All members of the panel with access to e-mail (N=895) were contacted, and asked to phone the service and give their feedback over the phone, as well as fill in the questionnaire and return it. We also asked participants to indicate whether they would like to participate in a subsequent focus group discussion.

The questionnaire findings describe the usability and acceptability aspects of the automatic speech recognition –based services. The response rate to the e-mail questionnaire (N=408, i.e., 45.6 %) was fairly good, taking into account the complexity of the evaluation task.

Responses to the service prototype were mainly positive, even though the participants did identify a number of aspects that could be improved. Automatic speech recognition and

the Internet were perceived of as the most convenient ways to make an appointment at the clinic (Table 1). More than one-third of the respondents considered the Internet "very convenient", whereas about one-fourth made the same evaluation of automatic speech recognition. When those who judged the service alternative "rather convenient" are included in the analysis, automatic speech recognition gains first place, i.e., is the service option that is considered convenient by the largest share of respondents. Third place is taken by "phoning a clerk at the appointment desk". In contrast, "traditional automatic phone services" (i.e., "press 1 for x, etc.") and visiting the clinic personally were considered convenient options by much fewer respondents.

Table 1: Convenience of automatic speech recognition compared to other options for making an appointment at the healthcare clinic (N=408)

Making an appointment by:	Percentage of respondents considering the option	
	very convenient, %	rather convenient, %
Visiting the healthcare clinic personally	3	11
Phoning a clerk at the appointment desk	19	47
Over the Internet	36	31
Using a "traditional" automatic phone service (i.e., "press 1 for x")	2	27
Using automatic speech recognition	23	56

Even though the respondents considered automatic speech recognition perhaps the best way to make an appointment at the clinic, the best applications for automatic speech recognition were envisaged in other services. Table 2 indicates that relatively low-risk and simple services were preferred. These include changing one's address information and buying tickets to a film. A majority considered automatic speech recognition to be very or rather suitable for the service that the respondents had tested – making an appointment at the clinic. Purchasing more expensive items, such as bus and train tickets and especially airline tickets or tours was viewed with more caution – although not fully rejected.

Table 2: Suitability of automatic speech recognition for different kinds of services (N=408)

	Percentage of respondents considering automatic speech recognition to be	
	very suitable, %	rather suitable, %
Making an appointment at the healthcare clinic	28	48
Purchasing tickets to a film	45	35
Purchasing bus or train tickets	22	45
Purchasing airline tickets or chartered tours	5	28
Changing one's address information in a register	59	29

Focus group discussions were employed to gain users' views of critical aspects of the tested speech recognition service, of the social acceptance of speech recognition services on a more general level, as well as ideas for suitable applications of automatic speech recognition in telephone services.Three focus group discussions were organized with consumers who had volunteered for such a discussion in the questionnaire. Altogether 22 consumers participated, including both men and women from different age groups. Some had volunteered because of a special interest in the service, e.g., personal experiences of convenient and inconvenient phone services.

Most discussants participating in the focus group discussions were positive toward the automatic speech recognition application that they had tested, but some were also quite critical. The positive participants did not, however, only give positive evaluations or feedback, but also voiced some quite critical comments – and vice a versa. One of the main reasons for negative attitudes was the argument that speech recognition is not especially suitable for healthcare services.

In the discussions, most attention was devoted to how logically the service proceeded, its usability and the way the service was presented. The discussants commented on benefits and problems of the service, and also made suggestions for improvements. Problems mentioned by the discussants included, for example, the slowness and repetitiveness of the service process. In contrast, others considered the slow pace a good thing. It was also suggested that it should be possible for users to select their preferred speed. Especially people with speech disabilities or poor Finnish skills were believed to find it difficult to understand a speedily proceeding service or long lists of numbers. People also discussed what users could do if the service doesn't work. Discussants suggested that there would be a shortkey to exit the service if things got too sticky. Overall, the opportunity to quickly change over to "a real person" was viewed as important. Discussants also considered potential failures and errors caused by the service and how they could be corrected. They presumed that humans would be needed to fix such errors. Discussants also agreed that the user of the service should be pre-warned before using the service that they will be dealing with an automat, not a person. Someone suggested that there should be a separate number for automatic service in the phone book.

The possibility to use automatic speech recognition technology in making appointments at the local healthcare clinic was appreciated especially because it would enable around-the-clock service. Automatic speech recognition gained support in this application also

because of the long queues for traditional telephone services. On the other hand, people hoped that automatic speech recognition would not become the only way to make appointments for healthcare services. Different alternatives should be available for different needs. Many viewed automatic speech recognition as an alternative to Internet-based services. Some did not see the need for automatic speech recognition: "wouldn't the Internet and ordinary phone services be sufficient?"

The different viewpoints presented in the focus group discussions about appropriate applications for automatic speech recognition supported and supplemented the viewpoints expressed in the questionnaire. The discussants believed that automatic speech recognition would be most suitable for services in which there is no need to ask the service provider about anything, and for "neutral services and neutral situations". Services currently accessible over the Internet or via "traditional automatic phone services" fell into this category. Some services were also identified for which automatic speech recognition was not considered suitable. In general, this included complex transactions involving many questions. Some believed it was not really very appropriate for healthcare – even booking an appointment, because people are often in poor condition and may be upset in such situations. Making an appointment also usually calls for the opportunity to ask questions and have a discussion with a real person.

We also raised the issue of whether people would require incentives to use automatic speech recognition services. The price of the services was often mentioned in this context. Discussants felt it almost a prerequisite that such services should be free of charge or provided at the price of a local phone call. Automatic services should also be provided 24 hours a day and should speed up the service process.

Social impacts of the technology were discussed both in the context of services based on automatic speech recognition and in the broader context of the increasing use of technology in service processes. It was noted, for example that elderly people or people with speech disabilities would most probably not want to use speech recognition services. As different types of services were viewed as necessary to serve the range of users, the issue of costs was also raised: would it make sense to have a variety of alternative telephone services? People were also concerned whether traditional, personal services would be kept on as new alternatives are developed. In general, there was concern that automatic speech recognition would probably lead to job loss. On the other hand, it might be positive if the most boring jobs were dealt with by automats, allowing people to focus on more meaningful and enjoyable tasks. A positive social impact was also the possibility of improved, 24-hour service for people working irregular shifts.

The negative aspects of increased dependence on technology were raised in all group discussions. There was concern that people would be increasingly "connected to wires". Automatic services might have large social impacts in the future, if they obviate the need for social contacts. Here, reference was made especially to pensioners and other people who do not have regular human contacts through their work. Some participants were apprehensive of where developments might lead in the end, if too much control is given over to technology.

The focus group discussions indicated that there is much dissatisfaction with existing telephone services. Thus, new solutions are very welcome. This may be one of the reasons why consumers were pleasantly surprised by their experience with the speech recognition -based service. Even while many were somewhat critical about the continual introduction of new technologies that reduce opportunities for personal contact and lead to job loss, the same discussants enthusiastically suggested new applications for speech recognition technologies in telephone services.

3.3 Usefulness of Consumer Feedback in Service Development

The company representatives were originally mainly interested in testing the basic functionality of the technology, and in gaining an overall response from a large sample of consumers. Additionally, our research team placed focus on exploring the usability of speech recognition in a telephone service context, on gauging potential users' views of the usefulness and social acceptance of the service, as well as on seeking users' ideas for appropriate applications of automatic speech technology.

The survey was important for the company to obtain quantitative data on consumer responses to the service and on how well the service functions for different kinds of users. We introduced focus group discussions in the study design in order to gain an in-depth understanding of the arguments underlying consumers' viewpoints. The focus groups served a slightly different purpose for the company representatives – for them, they were a forum for face-to-face interaction between the consumers and the service developers. Users had the opportunity to present their questions and comments directly to the service developers and get an immediate response. We also reserved time at the end of the discussions for the service developers to put forth additional questions. Direct interaction with users was a valuable experience for product developers in the company, as it allowed for the transfer of tacit knowledge and memorable real-life experiences.

The company had originally conceived of the study mainly as a marketing research exercise, and they were very satisfied with the user feedback obtained. They considered the feedback surprisingly positive, and were interested to learn more about why consumers were enthusiastic about this new technology. In contrast, it was not as obvious from the start how the study could be utilized in the company's product development efforts. Practical problems identified by the consumers were noted, and the process was considered a useful learning experience for addressing usability in service design. It was acknowledged that product developers become "a bit blind to their own ideas". Previous usability testing had been limited, and the experience gained here provided input for developing a more systematic approach to usability. Company representatives were of the opinion that our studies showed that they were "on the right track".

The company representatives gained a wealth of both positive and negative feedback on their service prototype and on automatic speech recognition technology. They were somewhat ambivalent about negative feedback, however. Especially issues pertaining to the social acceptance of the service were deemed "not so interesting". This is understandable in the company context: it is natural for people in a small startup company to be quite committed to their existing 'product' – after all, they have few alternatives. It is also not clear how such a company could go about addressing the negative social consequences of increasing reliance on technology. Yet the product developers did listen with keen interest to the focus group discussions on social impacts. Articulation of the social costs and benefits of the technology is clearly part of learning about the company's product, about future product requirements, and about the opportunities and risks of different product strategies.

4. Discussion

We examined the usefulness of consumer involvement in developing and introducing a new technology – automatic speech recognition – for telephone services. In our case study, consumers managed to produce useful information. They provided feedback and identified improvement needs, but also served up a wealth of contextual information and new service ideas. Even though there are many sophisticated methods available to involve consumers in service development, we used fairly conventional methods: user testing of a service prototype, a survey questionnaire and focus group discussions. These fairly

simple methods allowed us to gain timely feedback for service development, as well as to employ a layered study design fulfilling both our own and the company's requirements.

The process of first testing the service, then giving feedback through a survey, and finally participating in focus groups seems to have allowed users to expand their input from small technical suggestions to broader contextual information and new service ideas. The service prototype evaluated in our case study – i.e. making an appointment at the local healthcare clinic – served as a familiar point of reference for consumers. Even though the technology they were testing was unfamiliar, everyone has experience of making a doctor's appointment. Testing one type of application also helped consumers envisage what could be other suitable applications of automatic speech technology, and provided experience for voicing informed opinion about the technology.

The large-scale testing and survey were important for gaining the commitment of the company to our study, and also helped us find committed consumers willing to discuss the technology in more detail. In this specific case, focus groups seemed to be a fairly viable method for obtaining contextual information from users, as using a phone service appears to be an activity that can be verbalized relatively well. In the future, more contextual information, e.g., gained through observation of telephone service use in different applications, might be an appropriate complement to the existing data.

The focus groups also served as a forum for face-to-face interaction between users and developers, which was highly appreciated by the service developers. It has been previously noted that externally-produced studies may be difficult to integrate into the service development process (Kujala 2003). It seems that direct interaction provides information that is more actionable. Tacit knowledge is transferred, and face-to-face interaction produces memorable and meaningful experiences (cf. Weick 1995).

The consumer involvement process also seem to have pushed the company's approach to user research into a new stage: from functionality and usability to usefulness and social acceptability. We found that this is not an easy process for a small startup company with a strong commitment to its existing product. Yet through interaction with real-life users, the developers of this new technology were alerted to the need for a broader engagement and dialogue with current and future users and the general public (cf. Flint 2002). Our case study thus indicates that user involvement – even in a limited sense – can contribute to the quality of new technology applications. One-off interventions, however, have a limited impact on company learning. At best, user involvement should become a regular process.

References

Beyer, H., Holtzblatt, K. (1998): "Contextual Design: Defining Customer-Centered Systems", San Francisco, CA: Morgan Kaufmann.

Boddy, C. (2005): A rose by any other name may smell as sweet but "group discussion" is not another name for a "focus group" nor should it be. Qualitative Market Research, Vol. 8, No. 3, pp. 248 - 255.

Flint, D.J. (2002): Compressing new product success-to-success cycle time - Deep customer value understanding and idea generation. Industrial Marketing Management, Vol. 31, No. 4, pp. 305 - 315.

Forest, F., Arhippainen, L. (2005): Social acceptance of mobile services: observing and anticipating cultural aspects by a Sociology of User Experience method. Proceedings of the sOc-EUSAI'2005 Conference, 12 - 14 October 2005.

Hanna, N., Ayers, D.J., Ridnour, R.E., Gordon, G.L. (1995): New product development practices in consumer versus business product organizations, Journal of Product and Brand Management, 4 (1), 33 - 55.

Higgins, M. (2000): Divergent Messages in a Converging World. The Information Society, Vol. 16, pp. 49 - 63.

Karat, J., Karat, C.M. (2003): The evolution of user-centered focus in the human-computer interaction field. IBM Systems Journal, Vol. 42, pp. 532 - 541.

Kaulio, M.A. (1998): Customer, Consumer and User Involvement in Product Development: A Framework and a Review of Selected Methods. Total Quality Management, Vol. 9, No. 1, pp. 141 - 150.

Kotro, T., Timonen, P., Pantzar, M., Heiskanen, E. (2005): "The Leisure Business and Lifestyle". National Consumer Research Centre, Publications 2/2005, Helsinki.

Kujala, S. (2003): User Involvement. A Review of the Benefits and Challenges. Behavior & Information Technology, Vol. 22, No. 1, pp. 1-16.

LeMasson, P., Magnusson, P.R. (2002): Towards an Understanding of User Involvement Contribution to the Design of Mobile Telecommunications Services. European Institute for Advanced Studies in Management and Ecole des Mines de Paris, Vol. 2, pp. 497 - 511.

Magnusson, P. (2003): Benefits of involving users in service innovation, European Journal of Innovation Management, 6 (4): 228 - 238.

Monk, A.F. (2002): Fun, communication and dependability: extending the concept of usability. Closing plenary paper at HCI2002. Available online at: http://www-users.york.ac.uk/~am1/MonkHCI02.PDF.

Riquelme, H. (2001): Do consumers know what they want? Journal of Consumer Marketing, Vol. 18 Number 5 pp. 437 - 448

Threlfall, K.D. (1999): Using focus groups as a consumer research tool. Journal of Marketing Practice 5 (4): 102 - 105.

Tomes, A., Armstrong, P., Clark, M. (1996): User Groups in Action: The Management of User Inputs in the NPD Process. Technovation, Vol.16, pp. 541 - 551.

Venkatesh, V., Morris, M.G., Davis, G.B. , Davis, F.D. (2003): User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, Vol. 27, No. 3, pp. 425 - 478.

von Hippel, E. (1998): Economics of Product Development by Users: The Impact of "Sticky" Local Information. Management Science, Vol. 44, No.5, pp. 629 - 644.

Weick, K. (1995): "Sensemaking in Organizations", Sage, London.